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ENTOMOLOGICAL NEWS

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The Collembola of New Mexico. III. Onychiurinae [1, 2]

By HAROLD GEORGE SCOTT [3]

Eleven species of springtail insects are recorded in this part. None has been reported previously from New Mexico. The taxonomy of this subfamily has been badly confused. However, under the impetus of the controversial work of Bagnall (1949), remarkable clarification has been achieved in recent years (Stach, 1954; Salmon, 1959). Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Subfamily ONYCHIURINAE Borner, 1901

Pseudocelli present; scales absent; mouthparts chewing; head prognathous; distal antennal segments not annulate; eyes absent; body segments not ankylosed; furcula present or absent, when present not reaching collophore.

KEY TO WORLD GENERA OF ONYCHIURINAE

1. Furcula and body pigment well developed.....2
   Furcula absent or reduced; body generally unpigmented...4
2. Median shaft of maxilla well developed, toothed; Ant III sense organ with more than 5 papillae arranged in 2–3 transverse rows; adults 5–7 mm. long.....3

[1] A portion of a dissertation submitted to the Graduate Faculty of the University of New Mexico, Albuquerque, in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

[2] Part II, Ent. News, 71(7): 183–191.

[3] Training Branch, Communicable Disease Center, Bureau of State Services, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia.

Median shaft of maxilla absent; Ant III sense organ with 4 papillae in 1 transverse row; adults 0.6–1.5 mm. long (Japan) ..... **Lophognathella** Borner, 1909

3. Abd V and VI ankylosed dorsally; antennal bases with 3 + 3 pseudocelli; Ant IV tip with O small papillae (Japan) ..... **Tetrodontophora** Reuter, 1882

Abd V and VI not ankylosed dorsally; antennal bases with 1 + 1 pseudocelli; Ant IV tip with 6 small papillae (Japan) ..... **Homaloproctus** Borner, 1909

4. Clubs of Ant III sense organ bent toward each other (or, if straight, not concealed behind an integumentary fold); unguiculus absent or greatly reduced 5

Clubs of Ant III sense organ straight or curved but not bent toward each other; unguiculus present (Cosmopolitan) ..... **Onychiurus** Gervais, 1944 (*sensu lato*)

5. Body slender; postantennal organ present (Cosmopolitan) ..... **Tullbergia** Lubbock, 1876 (*sensu lato*)

Body stout; postantennal organ absent ..... **Hoffia** gen. nov.

Genus **Onychiurus** Gervais, 1844

Diagnostic Characteristics. Body stout; head broad; clubs of Ant III sense organ not bent toward each other; unguiculus present. Salmon (1959) considers this group to represent 12 separate genera. In the present paper Salmon's genera are considered subgenera of *Onychiurus* (see fig. 1).

Key to Nearctic Species of Onychiurus

1. Postantennal organ present 2

Postantennal organ absent ..... (*Metonychiurus*) **michelbacheri** (Bagnall, 1947)

2. Postantennal organ of simple vesicles 3

Postantennal organ of compound vesicles 15

3. Postantennal organ with 3–5 vesicles arranged in rosette ..... (*Arcaphorura*) **groendlandicus** (Tullberg, 1876)

Postantennal organ elongate with more than 5 vesicles arranged in rows 4

4. Vesicles of postantennal organ sub-parallel to long axis of organ (*Hymenaphorura*) 5

Vesicles of postantennal organ at right angles to long axis of organ 9

5. One pseudocellus on antennal base 6

Two or more pseudocelli on antennal base 8

6. Clubs of Ant III sense organ mushroom-like, coarsely granulated.....**cocklei** (Folsom, 1908)
Clubs of Ant III sense organ globular, mulberry or cone-like.....7
7. Vesicles of postantennal organ mostly simple.....**similis** Folsom, 1917
Vesicles of postantennal organ mostly bilobed or kidney-like.....**irregularis** Chamberlain, 1943
8. Antennal base with 2–3 pseudocelli..**subtenuis** Folsom, 1917
Antennal base with 4 pseudocelli...**magninus** Wray, 1950a
9. Clubs of Ant III sense organ smooth (*Handchiniella*)...10
Clubs of Ant III sense organ granulated (*Protaphorura*)..13
10. Unguiculus about one-half unguis in length.....**parvicornis** Mills, 1934
Unguiculus subequal to or longer than unguis in length..11
11. Unguiculus subequal to unguis in length.....**encarpatus** Denis, 1931
Unguiculus longer than unguis.....12
12. Antennal base with 4 pseudocelli.....**octopunctatus** (Tullberg, 1876)
Antennal base with 6 (rarely 5) pseudocelli.....**duodecimpunctatus** Folsom, 1919
13. Antennal base with 2 pseudocelli.....**litoreus** Folsom, 1917
Antennal base with 3 pseudocelli.....14
14. Unguiculus subequal to unguis in length.....**armatus** (Tullberg, 1869)
Unguiculus about one-half unguis in length.....**pseudarmatus** Folsom, 1917
15. Vesicles of postantennal organ, though tuberculated, clearly visible as separate structures.....16
Vesicles of postantennal organ not visible as separate structures, postantennal organ a mass of small tubercles....22
16. Clubs of Ant III sense organ undifferentiated, smooth (*Onychiurus*).....17
Clubs of Ant III sense organ differentiated, usually granulated (*Paronychiurus*).....20
17. Anal spines present.....**wilchi** Wray, 1950b
Anal spines absent.....18
18. Clubs of Ant III sense organ straight, ovoid, usually slightly bifurcated at tip.....**justi** Denis, 1938
Clubs of Ant III sense organ curved, cylindrical, rounded at tip.....19

19. Unguiculus with basal lamella.....
.....**pseudofimetarius** Folsom, 1917
Unguiculus without basal lamella.....
.....**fimetarius** (Linnaeus, 1767)
20. Hind margin of head without pseudocelli.....21
Hind margin of head with 4–6 pseudocelli.....
.....**oreadis** Mills, 1935
21. Anal spines to unguis as 1:2, papillae contiguous.....
.....**ramosus** Folsom, 1917
Anal spines to unguis as 3:4, papillae separated.....
.....**millsi** Chamberlain, 1943
22. Clubs of Ant III sense organ smooth.....
.....(*Psyllaphorura*) **obesus** Mills, 1934
Clubs of Ant III sense organ granulated or papillated.....
.....(*Pseudonychiurus*) **dentatus** (Folsom, 1902)

I have been unable to determine the status of two other species recorded from North America; *Onychiurus ambulaninermis* Denis, 1929, and *Onychiurus californicus* Coleman, 1941. The following species are recorded from New Mexico:

Onychiurus (Onychiurus) fiemetarius (Linnaeus, 1767)

NEW MEXICO RECORDS. Berlese, rotten fir log, 8,300 ft., Tejano Canyon, Sandia Mts., Bernalillo Co., 3–xi–1950.

DISTRIBUTION. N. M., Europe. As discussed in Stach (1954, pp. 173–179), this species has been regarded as cosmopolitan, but probably most determinations are in error. Therefore, re-evaluation of all prior records is required to establish distribution.

Onychiurus (Psyllaphorura) obesus Mills, 1934.

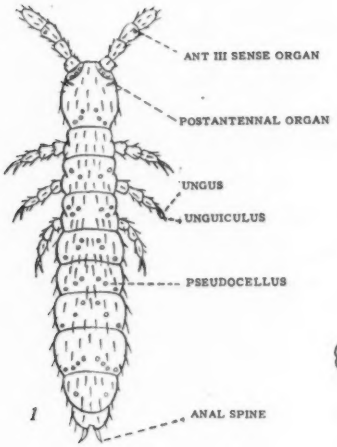
NEW MEXICO RECORD. Berlese, fir-aspen litter, 8,600 ft., NE of Valdez on Twining Road, Taos Co., 15–vii–1953.

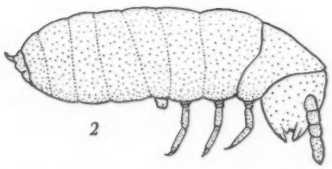
DISTRIBUTION. Iowa, N. M.

Onychiurus (Onychiurus) justi Denis, 1938.

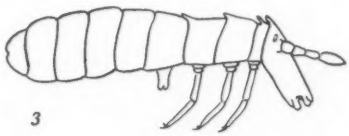
NEW MEXICO RECORD. Berlese, oak litter, 7,400 ft., Doc. Long's, Sandia Mts., Bernalillo Co., 29–v–1951.

DISTRIBUTION. Cal., Fla., Mass., N. M., Penna., Australasia.





Hoffia robusta gen. et sp. nov.



Onychiurus armatus (Tullberg) Tullbergia neomexicana sp nov

FIG. 1. *Onychiurus armatus* (Tullberg, 1869) with key structures labelled. FIG. 2. *Hoffia robusta* gen. et sp. nov., lateral view of holotype. FIG. 3. *Tullbergia neomexicana* sp. nov., lateral view of holotype.

Onychiurus (Paronychiurus) oreadis Mills, 1935.

NEW MEXICO RECORD. Berlese, fir-aspen litter, 9,200 ft., Sandia Mts., Bernalillo Co., 14–vii–1951.

DISTRIBUTION. N. M., Utah, Wash.

Onychiurus (Handschiniella) parvicornis Mills, 1934.

NEW MEXICO RECORDS. Berlese, rotten fir stump, 8,900 ft., Bear Trap Canyon, SW of Magdalena, Socorro Co., 12–ix–1954.

DISTRIBUTION. Iowa, N. M.

Onychiurus (Onychiurus) pseudofimetarius Folsom, 1917.

NEW MEXICO RECORDS. Berleses of (1) juniper litter, 7,600 ft., N. of pumice mine near Grants, Valencia Co., 22–vii–1953; (2) aspen litter, 8,700 ft., Sandia Mts., Bernalillo Co., no date

recorded; (3) aspen-fir litter, 9,700 ft., W of Vallecitos on Canjilon Road, Rio Arriba Co., 13–viii–1953.

Onychiurus (Hymenaphorura) similis Folsom, 1917.

NEW MEXICO RECORD. Berlese, rich aspen litter, 10,800 ft., Aspen Hill, near Santa Fe Ski Run, Santa Fe Co., 11–viii–1953.

DISTRIBUTION. Ill., N. M.

Onychiurus (Hymenaphorura) subtenuis Folsom, 1917.

NEW MEXICO RECORDS. Berleses of (1) juniper litter, 7,500 ft., S of Santa Fe, Santa Fe Co., 5–ix–1952; (2) rotten fir log, 8,300 ft., Tejano Canyon, Sandia Mts., Bernalillo Co., 3–xi–1950; (3) aspen litter, 8,700 ft., Sandia Mts., Bernalillo Co., no date recorded; (4) aspen litter, 10,000 ft., Santa Fe Ski Run, Santa Fe Co., 12–x–1952; and (5) fir litter, 10,000 ft., along Crest Drive, Sandia Mts., Bernalillo Co., 8–vii–1950.

DISTRIBUTION. Ill., Iowa, Mo., N. M., N. Y., N. C., Pa., Utah, Ontario.

Onychiurus (Onychiurus) wilchi Wray, 1950b.

NEW MEXICO RECORDS. Berleses of (1) aspen-spruce-fir litter, 9,250 ft., Holman Pass, NW of Holman, Mora Co., 9–vii–1953; and (2) aspen-fir litter, 10,600 ft., near crest, Sandia Mts., Bernalillo Co., 22–ix–1951.

GENUS **HOFFIA** gen. nov.

TYPE SPECIES. *Hoffia robusta* gen. et sp. nov. Figure 2.

DESCRIPTION. Body elongate, not subglobose, generally unpigmented; prothorax setaceous, well developed; pseudocelli present; head prognathous; furcula absent; mouthparts chewing; eyes absent; unguiculus and postantennal organ absent; clubs of Ant III sense organ bent toward each other; anal spines 2; body very stout, head narrow.

DISCUSSION. This genus is close to *Tullbergia,* but species of *Tullbergia* are slender with the body tapering gradually at each end, and always have postantennal organs. It is with pleasure that I name the genus for Dr. C. Clayton Hoff, Pro-

fessor of Biology, University of New Mexico, whose diligent collecting made this study possible.

Hoffia robusta gen. et sp. nov. Figure 2

TYPE LOCALITY: Holotype and 3 paratypes from 1 mi. N of pumice mine, N of Grants, Valencia Co., N. M.; field Berlese, Pinyon litter, 7,500 ft., 20–x–1951. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pa.

DESCRIPTION. Body elongate, not subglobose, generally unpigmented; body stout; head narrow; segmentation distinct, without ankylosis; integument minutely tuberculate; white; clothed by moderately long setae; pseudocelli present, difficult to perceive; head prognathous; antenna to head at 3:4; ratio of antennal segments approximately 7:5:6:14; clubs of Ant III sense organ bent toward each other; postantennal organ and eyes absent; mouthparts chewing; prothorax setaceous, well developed; unguiculus absent; unguis long, with one tooth; tenent hairs and furcula absent; anus terminal; anal spines 2, strongly curved, 1½ times as long as unguis III; adult length about 0.9 mm.

GENUS **TULLBERGIA** LUBBOCK, 1876

DIAGNOSTIC CHARACTERISTICS. Body slender, unpigmented; head narrow; postantennal organ with many tubercles; clubs of Ant III sense organ bent toward each other; unguiculus usually absent or greatly reduced; anal spines 0–4; furcula absent.

KEY TO NEARCTIC SPECIES OF *TULLBERGIA*

1. Anal spines present.....2
   Anal spines absent.....**neomexicana** sp. nov.
2. Abd VI with medio-ventral process.....3
   Abd VI without medio-ventral process.....4
3. Vesicles of postantennal organ simple.....
   .....**knowltoni** Wray, 1950
   Vesicles of postantennal organ horse-shoe shaped.....
   .....**incisa** Bonet, 1944

4. Abd VI tergite with pits, ridges, or warts.....5
   Abd VI tergite without pits, ridges, or warts.....7
5. Pair of tubercles or tuberculated areas anterior to anal spines on Abd VI.....**tuberosa** Bonet, 1944
   Semicircular ridged pits anterior to anal spines on Abd VI.....6
6. Postantennal vesicles in 2 transverse rows.....
   .....**krausbaueri** Borner, 1901
   Postantennal vesicles in 4 irregular transverse rows.....
   .....**foveata** Bonet, 1944
7. Postantennal vesicles in 2 transverse rows.....8
   Postantennal vesicles in 4 transverse rows.....9
8. Unguiculus bristle-like.....**granulata** Mills, 1934
   Unguiculus absent.....**clavata** Mills, 1934
9. Unguiculus bristle-like.....10
   Unguiculus absent.....**mexicana** Handschin, 1928
10. Ant III sense organ with club-like accessory hair.....
    .....**collis** Bacon, 1914
    Ant III sense organ without club-like accessory hair.....
    .....**baconae** (Bagnall, 1947)

Only one species of *Tullbergia* is recorded from New Mexico.

Tullbergia neomexicana sp. nov. Figure 3

TYPE LOCALITY. Holotype and 4 paratypes from foothills, Sandia Mts., Bernalillo Co., N. M.; Berlese of oak litter, 6,400 ft., 5–ix–1951. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pa.

DESCRIPTION. Body elongate, slender; segmentation distinct, without ankylosis; integument smooth, white; clothed with moderately long setae; scales absent; pseudocelli present; head narrow, prognathous; antenna shorter than head; clubs of Ant III sense organ bent toward each other; postantennal organ with numerous simple tubercles; eyes absent; mouthparts chewing; pronotum setaceous; tibiotarsus without distal subsegment; claws tunicate; unguiculus to unguis as 3:8; tenet hairs absent; unguis and unguiculus without teeth; furcula absent; anus terminal; anal spines absent; adult length about 0.6 mm.

DISCUSSION. This species is distinguished from other members of the genus by the well-developed unguiculus and absence of anal spines.

NEW MEXICO RECORDS. Type collection plus Berleses of (1) oak litter, and (2) aspen litter, 8,700 ft., no date recorded, Sandia Mts., Bernalillo Co.

SUMMARY

Record is made of 9 species of *Onychiurus, Hoffia robusta* gen. et sp. nov., and *Tullbergia neomexicana* sp. nov., from New Mexico. Ecological data are presented for all 11 species. Keys to world genera of Onychiurinae and to Nearctic species of *Onychiurus* and *Tullbergia* are included.

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Another Record of the Larva of Epiophlebia laidlawi Tillyard, (Odonata: Anisozygoptera).

By ARTHUR SVIHLA, Ford Foundation—University of Florida—University of Mandalay Program, Mandalay, Burma

At the present time only two species of *Epiophlebia* of the sub-order Anisozygoptera are known, *Epiophlebia superstes* Selys which occurs in Japan and *Epiophlebia laidlawi* Tillyard from the Himalayas.

In 1921 Tillyard (Rec. Ind. Mus. 22: 93–107) described the Himalayan form as *laidlawi* from a single nymph which had been collected in the Darjeeling district at an elevation of 7000 feet by Dr. S. Kemp from a rapidly flowing stream between Ghoom * and Sonada. Later searches by specialists for both adults and larvae were unsuccessful until Asahina in March 1958 (Tombo 1(1): 1–2) first rediscovered the nymph. He collected a series from a stream between Ghum and Rangbhul. His collections consisted of one ultimate male instar (the first for this species); one penultimate female (the type of *E. laidlawi* was a penultimate male); four tertiultimate larvae; and one quartultimate larva.

Dr. Asahina very kindly told me where he had collected these specimens, and, on October 9, 1960, I visited what I believed to be the same site and collected three ultimate female larvae (the first for this species) and two larvae much younger than the youngest in Dr. Asahina's collection.

For the benefit of future collectors the site of my collection may be described as the rocky stream which passes under the Siliguri-Darjeeling railroad track near Rangbhul at marker number 469. Above the bridge there is a short stretch of rapidly flowing water about 100 feet long where the larvae were found. This is blocked up-stream by a waterfall. Below the bridge and highway is another waterfall (artificially made) but the stream persists and continues to lower levels. There is every reason to believe that larvae occur above and below the two waterfalls mentioned. Lack of time prevented my further search.

* Ghoom is variously spelled as Ghum and Ghun. At present the preferred spelling is Ghum.

No adults of this species were seen on this date. In fact no dragon-flies of any sort were seen in flight in this area on this visit. The imago still remains unknown.

I agree with Dr. Asahina that the habitats of the nymphs of the two species of *Epiophlebia* are quite similar.

A Catalogue of the Schendylinae of North America including Mexico, with a Generic Key and Proposal of a New Simoporus (Chilopoda: Geophilomorpha: Schendylinae)

By R. E. Crabill, Jr., Smithsonian Institution, Washington, D. C.

(*Continued from p. 36*)

Catalogue of the Schendylines Presently Known from Mexico, the Continental United States, and Canada

The following catalogue of genera and species is believed to include reference to all schendylines now known to occur in, or to have been reported from, the American continent from Alaska south through Mexico. The forms of continental islands and archipelagos are included, but those of the Caribbean islands proper, of most of Central America, and of all of South America are not, unless, of course, they also occur within the area under consideration.

For each genus and species a summary synonymy is presented together with literary citations. The type-species of each genus is identified, and the method of fixation is parenthesized thereafter. Ranges are summarized, and in some instances notes on identity or generic assignment are appended. In the cases of non-monotypic genera, and whenever possible, selected, useful keys to species are recommended through reference to their literary source and author.

The reader's attention is directed to the following keys to schendylid (or schendyline) genera. (1) Cook, 1904, p. 76:

key to known schendyline genera including *Holitys,* q.v. (2) Broelemann and Ribaut, 1912, p. 97: key to known schendyline genera; especially recommended for its exhaustively detailed figures and verbal descriptions; but see note under *Pectiniunguis* below. (3) Attems, 1929, p. 58: key to known genera; remains the most useful of keys for world fauna but somewhat outdated. (4) Chamberlin, 1943, p. 12: key to most genera represented in Mexico and Central America. (5) Chamberlin, 1947b, p. 147: key to most genera represented in all of the Americas, with some omissions, e.g., *Brachyschendyla* and *Hydroschendyla.* (6) Crabill, 1953, p. 94: key to northeastern North American genera and species.

APUNGUIS Chamberlin

Apunguis Chamberlin, 1947c, p. 260.

Type-species: *Apunguis prosoicus* Chamberlin, 1947. (Original designation and monotypic).

Range: Known only from the locality of the type-species.

Apunguis prosoicus Chamberlin

Apunguis prosoicus, Chamberlin, 1947c, p. 2660.

Type-locality: Texas: Eagle Pass; intercepted on fruit from Mexico.

Range: Known only from type-locality.

ESCARYUS Cook and Collins

Escaryus Cook and Collins, 1891, p. 391.

Type-species: *Escaryus phyllophilus* Cook and Collins, 1891 [= *Escaryus urbicus* (Meinert), 1886]. (Subsequent designation of Cook, 1895, p. 71).

Range: Temperate to arctic North America, eastern and central Asia.

Selected keys: Cook, 1904, p. 76: to known species.[7] Attems, 1929, p. 95: to known species. Chamberlin, 1946a, p. 178: to

[7] The original publication of Cook's well-known species *Escaryus albus* appeared in this publication and is included in the key. *E. albus,* a stubborn *Poltergeist,* has been metioned faithfully by all persons who have treated the Alaskan fauna, even though no one has succeeded in uncover-

species of Alaska and adjacent Siberia. Chamberlin, 1947a, p. 37: presumably to known species, but some are omitted. Crabill, 1953, p. 96: to species of northeastern North America.

Escaryus delus Chamberlin

?Escaryus ethopus (Chamberlin), 1920, p. 43.
Escaryus delus Chamberlin, 1946a, p. 178.

Type-locality: Alaska: Circle City, Fairbanks.
Range: Known only from the two type-localities.

Escaryus ethopus (Chamberlin)

Geophilus ethopus Chamberlin, 1920, p. 43.
Escaryus ethopus (Chamberlin), [New combination].

Type-locality: Alaska: Iditarod Island.
Range: Known only from the type-locality.

Notes: This species, originally placed in the wrong genus and family, is clearly both a schendylid and a member of *Escaryus;* this is proved unquestionably by its distinctive mouthparts which had never been dissected before my recent study of the holotype at Harvard. Its characteristics do not seem immediately suggestive of any described *Escaryus,* although in some features one could perhaps find grounds for suspecting an affinity with *E. delus* Chamberlin, *q.v.*

The following diagnostic characteristics, drawn from a recent study of the *ethopus* holotype, were not mentioned in Professor Chamberlin's original description of the species. In a report now in progress, wherein the whole Alaskan chilopod fauna will be treated, a full and detailed description of *ethopus* will be presented. Paraclypeal sutures of the clypeus present only anteriorly as fragments, totally absent over two-thirds of their hypothetical posterior course; distinct plagulae absent; clypeal areas

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ing additional specimens. The explanation for this is simple and almost incredible. Having discovered the two Cook cotypes of *albus,* after they had been lost for many years, I found them to be juvenile specimens of some species of *Strigamia,* hence not even members of Schendylidae! Their poor state of preservation and immaturity, however, preclude a specific assignment within *Strigamia* at this time. At the same time, there can be no doubt whatever about the genus to which they are properly assignible.

absent. Labrum with about 25 teeth, these occupying the full width of the midlabral arch. First maxillae: with robust, coarsely squamulate telopodite lappets, these reach about $\frac{2}{3}$ the length of the telopodites: coxosternal lappets essentially absent, being extremely low and broad. Second maxillae: telopodite claw very robust, apically somewhat bent, with coarsely, strongly pectinate edges. Prehensors: femuroid and tibioid as well as tarsungula (unlike eastern North American species) totally without denticles; trochanteroprefemur with a low, very small denticle. Ultimate pedal segment: pretergite laterally not suturate; tergite much wider than long; sternite very long and nearly perfectly rectangular, midlongitudinally shallowly sulcate; coxopleura antero-posteriorly very long, moderately inflated, pierced by numerous small to large pores, many of these irregularly shaped; legs (of ♂) greatly swollen, somewhat flattened dorso-ventrally, the unguiform pretarsi missing. Anal pores present, large.

Escaryus liber Cook and Collins

Escaryus liber Cook and Collins, 1891, p. 394.

Type-locality: New York: Kirkville.

Range: New York, Maryland, District of Columbia, Ohio. Probably distributed throughout much of northeastern North America.

Escaryus missouriensis Chamberlin

Escaryus missouriensis Chamberlin, 1942, p. 185.

Type-locality: Missouri: St. Louis Co., 4.3 miles northwest of Glencoe.

Range: Missouri, Indiana, Illinois. Probably is widespread in the midwestern United States.

Escaryus monticolens Chamberlin

Escaryus monticolens Chamberlin, 1947a, p. 37.

Type-locality: Utah, Mill Creek Canyon.

Range: Known only from the type-locality.

Escaryus paucipes Chamberlin

Escaryus paucipes Chamberlin, 1946a, p. 179.

Type-locality: Alaska: Haines.

Range: Known only from the type-locality.

Escaryus urbicus (Meinert)

Geophilus urbicus Meinert, 1886, p. 218.
Escaryus phyllophilus Cook and Collins, 1891, p. 392.
Escaryus urbicus (Meinert), -Bailey, 1928, p. 44.

Type-locality: Massachusetts: Cambridge.
Range: Northeastern North America. Probably extends far southward at higher elevations in the Appalachians.

HOLITYS Cook

Holitys Cook, 1899, p. 304.
?*Mexiconyx* Chamberlin, 1922, p. 9.
?*Simoporus* Chamberlin, 1940a, p. 109.

Type-species: *Holitys neomexicana* Cook, 1899. (Monotypic.)
Range: Known only from the locality of the type-species.

Key: Cook, 1904, p. 76: the only known key including *Holitys*.
Notes: Unfortunately, the information that Cook gave is most fragmentary. Piecing together the information given in the original description with that in his 1904 key, we learn the following about the form. Ultimate pretarsus is present and unguiform; ultimate legs, reportedly of a ♀, are inflated, subdensely setose, have two tarsal articles. The coxopleural gland openings, if present, are concealed. The ultimate pedal sternite is much wider than long. Ventral porefields are present and in shape are circular, in position, median. The genus is claimed to be like *Pectiniunguis* in some respects (in which?). The holotype is a ♀ 15 mm long and has 45 pedal segments.

Thus, we know nothing definite about the species' mouthparts, and all we can say about the coxopleural glandular condition is that if a pore is or if pores are present, then they are concealed. Clearly it is impossible on the basis of such evidence alone to come to any even reasonably confident decision anent the disposition of the Cook name. At the same time, I believe it is possible to suggest from this evidence, poor and indirect as it is, that it would be very difficult to preclude the possibility that *Holitys* is identical with, or very closely related to, *Simoporus* or *Mexiconyx,* or both. This is admittedly a reasonable guess; it cannot at the present time be substantiated, the type being unavailable.

Holitys neomexicana Cook

Holitys neomexicana Cook, 1899, p. 304.
Holitys neomexicana Cook. -Attems, 1929, p. 99. ["Ganz ungenügende Diagnose"].

Type-locality: New Mexico: Organ Mountains, Dropping Spring.
Range: Known only from the type-locality.

MEXICONYX Chamberlin

?*Holitys* Cook, 1899, p. 304
Mexiconyx Chamberlin, 1922, p. 9.

Type-species: *Mexiconyx hidalgoensis* Chamberlin, 1922. (Original designation and monotypic.)
Range: Known only from the locality of the type-species.

Notes: See notes under *Holitys*.

Mexiconyx hidalgoensis Chamberlin

Mexiconyx hidalgoensis Chamberlin, 1922, p. 9.

Type-locality: Mexico: Hidalgo, Guerrere Mill.
Range: Known only from the type-locality.

MORUNGUIS Chamberlin

Morunguis Chamberlin, 1943, p. 15.

Type-species: *Morunguis morelus* Chamberlin, 1943. (Original designation and monotypic).
Range: Known only from locality of the type-species.

Morunguis morelus Chamberlin

Morunguis morelus Chamberlin, 1943, p. 15.

Type-locality: Mexico: Morelos, Parque Nacional de Zempoala.
Range: Known only from the type-locality.

NESONYX Chamberlin

Nesonyx Chamberlin, 1923, p. 397.

Type-species: *Nesonyx flagellans* Chamberlin, 1923. (Original designation and monotypic.)
Range: Known only from the locality of the type-species.

Nesonyx flagellans Chamberlin

Nesonyx flagellans Chamberlin, 1923, p. 397.

Type-locality: Mexico: Gulf of California, Georges Island.

PARUNGUIS Chamberlin

Parunguis Chamberlin, 1941, p. 788.

Type-species: *Parunguis kernensis* Chamberlin, 1941. (Original designation and monotypic.)

Range: Southern and central Mexico, and Texas.

Parunguis boneti Chamberlin

Parunguis boneti Chamberlin, 1943, p. 13.

Type-locality: Mexico: D.F., Desierto de los Leones, San Rafael.

Range: Known only from the type-locality.

Parunguis cardenasi Chamberlin

Parunguis cardenasi Chamberlin, 1943, p. 13.

Type-locality: Mexico: D.F., Rio Frio.

Range: Known only from the type-locality.

Parunguis kernensis Chamberlin

Parunguis kernensis Chamberlin, 1941, p. 788.

Type-locality: California: Kern Co., 4 miles east of Glenville.

Range: Known only from type-locality.

Parunguis paucipes Chamberlin

Parunguis paucipes Chamberlin, 1943, p. 14.

Type-locality: Mexico: Vera Cruz, Orizaba, Cuesta de Acultzingo, "Monte Bajo."

Range: Known only from type-localities.

PECTINIUNGUIS Bollman

Pectiniunguis Bollman, 1889, p. 212.
Adenoschendyla Broelemann, 1911, p. 192.
Litoschendyla Chamberlin, 1923, p. 391. [New synonymy.]

Type-species: *Pectiniunguis americanus* Bollman, 1889, p. 212. (Original designation.)

Range: Coastal southern California and Mexican Lower California; Antilles and South America. Probably widespread on the coasts of tropical and subtropical America.

Selected Keys: Broelemann and Ribaut, 1912, pp. 100, 106: keys to the known species of *Pectiniunguis* and *Adenoschendyla* (= *Pectiniunguis*). Chamberlin, 1914, p. 201: key to species

of *Adenoschendyla*. Attems, 1929, pp. 81, 84: keys to known species.

Notes: For a discussion of my grounds for provisionally uniting *Litoschendyla* and *Pectiniunguis*, the reader is referred to Crabill, 1959, p. 324.

Pectiniunguis americanus Bollman

Pectiniunguis americanus Bollman, 1889, p. 212.

Type-locality: Mexico: "Gulf of California, Pichiliungue Bay." The original locality citation of Bollman is in error. The correct rendition is: Mexico, Lower California, *Pichilinque* Bay.

Range: Strictly speaking, the species is known only from the type-locality; Cook's 1899 report of it from Florida was based upon a misidentification.

Notes: See discussion in Crabill, 1959, p. 324.

Pectiniunguis amphibius Chamberlin

Pectiniunguis amphibius Chamberlin, 1923, p. 392.

Type-locality: Mexico: Gulf of California, Danzante Island.
Range: Known only from the type-locality.

Pectiniunguis catalinensis Chamberlin

Pectiniunguis catalinensis Chamberlin, 1941, p. 787.

Type-locality: California: Catalina Island, "near Black Jack."
Range: Known from type-locality only.

Pectiniunguis halirrhytus Crabill

Pectiniunguis halirrhytus Crabill, 1959, p. •.

Type-locality: Florida: Monroe Co., Big Pine Key.
Range: Florida Keys. Probably ranges widely from southern coastal Florida throughout much or all of the West Indies.

Notes: When Cook reported *americanus* from the Florida Keys in 1899 (p. 305), his records were actually based upon a different species, *halirrhytus*, which he did not identify as such. See discussion in Crabill, 1959, p. 324.

Pectiniunguis nesiotes Chamberlin

Pectiniunguis nesiotes Chamberlin, 1923, p. 391.

Type-locality: Mexico: Gulf of California, San Esteban Island.
Range: Type-locality only.

SCHENDYLA Bergsöe and Meinert

Schendyla Borgsöe and Meinert, 1866, p. 103.

Type-species: *Geophilus nemorensis* C. L. Koch, 1836 [= *Schendyla* (*Schendyla*) *nemorensis* (C. L. Koch)]. (Monotypic.)

Range: Europe, Asia, North and South America, North Africa.

Selected key: Attems, 1929, p. 59.

Schendyla nemorensis (C. L. Koch)

Geophilus nemorensis C. L. Koch, 1836, p. •.
Poabius bistriatus C. L. Koch, 1847, p. 183.
Linotaenia nemorensis (C. L. Koch), -Koch, 1863, p. 26.
Schendyla nemorensis (C. L. Koch), -Bergsöe and Meinert, 1866, p. 105.
Geophilus tyrolensis Meinert, 1870, p. 73.
Geophilus gracilis Harger, 1872, p. 18.

Range: Europe, North Africa, North America. Evidently readily transported and easily established; probably occurs widely throughout the temperate Holarctic region through repeated introductions. In the United States *nemorensis* is known to occur in many of the states east of the Mississippi and north of Virginia; elsewhere reports of it have been sporadic. Eventually it will very likely be known to inhabit many, or most, of our states.

SERRUNGUIS Chamberlin

Serrunguis Chamberlin, 1941, p. 789.

Type-species: *Serrunguis paroicus* Chamberlin, 1941. (Original designation and monotypic.)

Range: Known only from the locality of the type-species.

Serrunguis paroicus Chamberlin

Serrunguis paroicus Chamberlin, 1941, p. 789.

Type-locality: California: Mountain Springs.

Range: Known only from the type-locality.

NYCTUNGUIS Chamberlin

Nyctunguis Chamberlin, 1914, p. 201.

Type-species: *Pectiniunguis montereus* Chamberlin, 1904 [= *Nyctunguis montereus* (Chamberlin)]. (Original designation.)

Range: Mexico, California, Tennessee, Texas, Utah, Arizona.

Notes: Despite the assignment of many species to this genus, no key to the species has ever been published. These species, as described, are clearly all quite similar, and, on the basis of their printed descriptions, it is extremely difficult or impossible to identify the majority of them with confidence. This problem is further complicated by the rarity of specimens assignable to *Nyctunguis* in collections. It is probably not too extreme to suggest that nearly all such identified specimens are members of typical series or are holotypes.

Nyctunguis apachus Chamberlin

Nyctunguis apachus Chamberlin, 1941, p. 786.

Type-locality: Arizona: 38 miles south of Ajo (♀ holotype); 20 miles south of Ajo (♀ paratype).

Range: Known only from the two type-localities and from North Sasaba, Arizona.

Nyctunguis arcochilus Chamberlin

Nyctunguis arcochilus Chamberlin, 1941, p. 785.

Type-locality: Texas: Laredo.

Range: Known only from the type-locality.

Nyctunguis auxus Chamberlin

Nyctunguis auxus Chamberlin, 1941, p. 787.

Type-locality: California: Coyote Wells.

Range: Known only from the type-locality.

Nyctunguis catalinae (Chamberlin)

Pectiniunguis heathii catalinae Chamberlin, 1912a, p. 669.
Nyctunguis catalinae (Chamberlin), -Chamberlin, 1923, p. 396.

Type-locality: California: Catalina Island, Claremont.

Range: Known only from the type-localities.

Nyctunguis dampfi (Verhoeff)

Schendylunguis dampfi Verhoeff, 1926, p. 103.
Nyctunguis dampfi (Verhoeff), -Attems, 1929, p. 88.

Type-locality: Mexico: Desierto de los Leones.

Range: Known only from the type-locality.

Notes: In describing *Simoporus koestneri, q.v.,* Professor Chamberlin alerted the reader to the similarity between his new spe-

cies and *dampfi* as described by Verhoeff (Chamberlin, 1940b, p. 65). The apparent similarity in many characters is indeed impressive, but its interpretation must wait until we know much more than we do now about the whole ensemble of microschendylines of which these species are members.

Through the kindness of Dr. Wilhelm Engelhardt of the Zoologische Sammlung des Bayerischen Staates at Munich I have been privileged to examine Verhoeff's original type specimens. They differ most notably (and, under the present system, generically) from *koestneri* and its congeners in their possession of two distinct pores on each coxopleuron. In *koestneri* there is reportedly just one. It is also important to report that Verhoeff's figure of the first maxillae is in error, for careful study reveals that the first maxillae of the *dampfi* holotype have distinct, though concealed, telopodite lappets as well as frail, small coxosternal lappets. Attems and others, on Verhoeff's evidence, have assumed them to be absent.

Nyctunguis danzantinus Chamberlin

Nyctunguis danzantinus Chamberlin, 1923, p. 395.

Type-locality: Mexico, Gulf of California, Danzante Island.
Range: Known only from the type-locality.

Nyctunguis glendorus Chamberlin

Nyctunguis glendorus Chamberlin, 1946b, p. 69.

Type-locality: California: Glendora, Los Angeles National Forest.
Range: Known only from the type-locality.

Nyctunguis heathii (Chamberlin)

Pectiniunguis heathii Chamberlin, 1909, p. 176.
Nyctunguis heathii (Chamberlin), -Chamberlin, 1914, p. 201.

Type-locality: California: Monterey Co., near Cypress Point.
Range: Known only from type-locality.

Nyctunguis libercolens Chamberlin

Nyctunguis libercolens Chamberlin, 1923, p. 395.

Type-locality: California: Stanford and environs.
Range: Known only from the type-locality.

Nyctunguis mirus Chamberlin

Nyctunguis mirus Chamberlin, 1923, p. 393.

Type-locality: Mexico: Lower California, Ensenada de Todos Santos.

Range: Known only from the type-locality.

Nyctunguis molinor Chamberlin

Nyctunguis molinor Chamberlin, 1925, p. 58.

Type-locality: Utah: Mill Creek Canyon.

Range: Known only from the type-locality.

Nyctunguis montereus (Chamberlin)

Pectiniunguis montereus Chamberlin, 1904, p. 653.

Nyctunguis montereus (Chamberlin), -Chamberlin, 1914, p. 201.

Type-locality: California: Pacific Grove, Bay of Monterey.

Range: California.

Nyctunguis pholeter Crabill

Nyctunguis pholeter Crabill, 1958, p. 154.

Type-locality: Tennessee: DeKalb Co., Cripps' Mill, Cripps' Mill Cave.

Range: Known only from the type-locality.

Nyctunguis vallis Chamberlin

Nyctunguis vallis Chamberlin, 1941, p. 786.

Type-locality: California: Carmel Valley, Hastings Reservation.

SIMOPORUS Chamberlin

?*Holitys* Cook, 1899, p. 304.

Simoporus Chamberlin, 1940a, p. 109.

Type-species: *Simoporus texanus* Chamberlin, 1940a. (Original designation and monotypic.)

Range: Northeastern Mexico, Texas, Arkansas. Should probably be expected throughout the Gulf States.

Notes: See notes under *Holitys* and *Nyctunguis dampfi*.

Simoporus arcanus Crabill

Simoporus arcanus Crabill, new species.

Type-locality: Arkansas: Washington Co., 4 miles west of Farmington.

Range: Known only from the type-locality.

Simoporus koestneri Chamberlin

Simoporus koestneri Chamberlin, 1940b, p. 65.

Type-locality: Mexico: Nuevo Leon, Cerro Potosi.
Range: Known only from type-locality.

Notes: See discussion under *Nyctunguis dampfi*.

Simoporus texanus Chamberlin

Simoporus texanus Chamberlin, 1940a, p. 109.

Type-locality: Texas: Bandera Co., 2 miles north of Medina.
Range: Known only from the type-locality.

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[8] Since many new forms and categories are presented in this publication, it is important to note here that although it is imprinted "1895," and although all authors to date have cited it under that year, National Mu-

1899. Proc. Ent. Soc. Wash. 4: 303–312.
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Some Insect Visitors of Mat Euphorbia in Southeastern Arizona [1] (Hymenoptera, Diptera)

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Hymenopterists collecting in the southwestern United States have known for many years of the attractiveness of the tiny flowers of *Euphorbia albomarginata* Torrey and Gray to certain small wasps and bees. The plant has a prostrate growth habit and occurs in scattered mats up to about 45 cm. in diameter. The mats are most common along roadsides where the plants receive the extra moisture from runoff. Flowers are produced

seum records show that this publication was actually first issued to the public on April 23, 1896.

[1] This contribution was made possible by a grant from the American Philosophical Society for a study of the solitary wasps and bees nesting in borings in wooden traps, and was incidental to that project; the results of the trap nest investigations will appear in a separate contribution.

over a long period of time, which makes the plant very attractive to smaller aculeates during periods when few other desert plants are in bloom.

To date no list of the particular groups of wasps and bees attracted to these flowers and their relative abundance has been published. I take this opportunity to publish some data obtained during my residence at the Southwestern Research Station of the American Museum of Natural History, July 17 to 31, 1959.[2] Included in an appendix is a list of the other Hymenoptera and certain Diptera obtained on the plants also. Concurrent observations were being made on several ground-nesting wasps, so I devoted only several hours on July 23, 26, 27, and 28, and most of July 24 to collecting on the *Euphorbia*. Collections were made along the desert roadside from 3 to 8 miles east of Portal, Ariz., at about 4,000 ft. elevation.

Identifications in the following list are by myself except as acknowledged.

Family Chrysididae

Hedychridium sp. 3 ♂♂.

Family Tiphiidae

Quemaya perpunctata (Ckll.). 1 ♂; taken at 2 p.m. in bright sun; this is one of the few diurnal species of Brachycistidinae.

Family Pompilidae

Ageniella (*Ageniella*) *partita* Bks. 1 ♂.
Anoplius (*Arachnophroctonus*) *xerophilus* Evans (det. H. E. Evans). 1 ♂.

Family Sphecidae

Astata nevadica Cr. 1 ♀.
Plenoculus cockerellii Fox (det. F. X. Williams). 3 ♀♀, 1 ♂.
Solierella clypeata Wms. (det. F. X. Williams). 2 ♀♀.
Solierella vierecki (Roh.). 5 ♀♀, 1 ♂.
Nitelopterus californicus (Ashm.). 3 ♂♂.
Tachysphex coquilletti Roh. 1 ♀, 3 ♂♂.

[2] I am indebted to Director Mont Cazier for making available the facilities of the Station in support of these several projects.

Tachysphex propinquus Vier. 1 ♂.
Tachysphex sp. #1. 8 ♂♂; this and the following are small species, male with black abdomen.
Tachysphex sp. #2. 2 ♀♀, 1 ♂.
Tachysphex sp. #3. 2 ♀♀, 3 ♂♂; this and the following two are small species, females with abdomen all red, males with abdomen red and black.
Tachysphex sp. #4. 28 ♀♀, 23 ♂♂.
Tachysphex sp. #5. 17 ♀♀, 16 ♂♂.

Xylocelia sp. 2 ♀♀, 2 ♂♂. Apparently females of this species prefer to start their burrows in a vertical surface when one is available; on July 28 I collected 5 additional females that were attracted to the vertical walls of an excavation I had made to uncover a nest of *Eucerceris triciliata* Scullen.

Nysson (*Epinysson*) sp. 1 ♀.
Foxia navajo Pate. 1 ♀.
Hapalomellinus sp. 1 ♀.
Moniaecera (*Moniaecera*) *evansi* Pate. 1 ♀, 4 ♂♂.
Oxybelus abdominale Baker. 1 ♀.

Family Andrenidae

Perdita (*Perditella*) *minima* Ckll. (det. P. H. Timberlake). 5 ♀♀, 6 ♂♂; some of the females were gathering pollen.
Perdita (*Hexaperdita*) *callicerata* Ckll. (det. P. H. Timberlake). 1 ♂.
Pseudopanurgus sp. (det. P. H. Timberlake). 1 ♂.
Calliopsis (*Perissander*) sp. (det. P. H. Timberlake). 1 ♀.
Calliopsis (*Perissander*) *anomoptera* Mich. 15 ♀♀, 35 ♂♂. Only males were taken on July 23 and 24; most of them were newly emerged, but a few showed denuded areas on the scutum indicating that they had been on the wing for several days. Freshly emerged females were present on the flowers on the 26th. Only two of these females bore pollen masses on the hind tibiae; these masses were identified by Paul S. Martin as being composed entirely of *Euphorbia* pollen, so undoubtedly the *anomoptera* females were visiting the flowers for both pollen and nectar. One male attempted to mate by flying down and alighting on a female on the *Euphorbia,* but aside from this there was no evidence of mating activity. I looked for the bur-

rows in the immediate area without finding the nesting site. I did not collect all the females that were present. P. D. Hurd collected 31 ♀♀ and 22 ♂♂ on *Euphorbia albomarginata* in this same area from August 9 to 15, 1958. A. F. Shinn reports (*in litt.*) that this species has been taken elsewhere in Arizona from July 7 to September 15, so apparently it is double-brooded.

Family Halictidae (all det. P. H. Timberlake)

Chloralictus clematisellus (Ckll.). 3 ♀♀, 1 ♂; the females were gathering pollen.

Chloralictus sp. 15 ♀♀, 1 ♂; several of the females were gathering pollen.

Dialictus sp. 1 ♀, 1 ♂; the female was collecting pollen.

Sphecodes sophiae Ckll. 1 ♀.

Appendix

The following parasitic Hymenoptera were collected on these flowers.

Braconidae (det. C. F. W. Muesebeck): 1 ♀ *Apanteles scutellaris* Mues.; 1 ♀, 1 ♂ *Chelonus phthorimaeae* Gah.

Pteromalidae (det. B. D. Burks): 1 ♀ *Catolaccus aeneoviridis* (Grlt.).

Chalcididae (det. B. D. Burks): 1 ♀, 1 ♂ *Hockeria* sp.; 2 ♀♀ *Euchalcidia* sp. #1; 2 ♀♀ *Euchalcidia* sp. #2.

The following Diptera also were collected on flowers. Miltogrammini were very abundant and no attempt was made to collect all specimens seen.

Bombyliidae (det. W. W. Wirth): 1 *Astrophanes adonis* O. S.; 1 *Villa lepidota* (O. S.); 1 *Villa* sp. #1; 1 *Villa* sp. #2.

Chloropidae (det. C. W. Sabrosky): 1 *Siphonella projecta* Mall.

Tachinidae (det. C. W. Sabrosky): 1 *Hyalomya aldrichii* Tns.; 5 *Microchaetina valida* Tns.

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